



Project Objectives

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During the first year of this study, we have tried to characterize each of the storage facilities in the area-wide stored grain IPM project. By examining when and where grain is treated and at what insect densities we hope to be able to provide you with better information to manage your grain. This next year we will be focusing on trying to sample the same lot of grain multiple times for quality and insect density. This will allow us to see how grain quality and insect density change during storage, and to be able to predict these changes. Aeration is another area we are investigating. Specifically, we want to do side-by-side comparisons of no aeration, manual aeration, and aeration with automatic controllers. We know that lowering grain temperature as soon as possible suppresses insect growth. We think the best way to do this is with automatic aeration controllers.



Methods

The device pictured to the right is a sensor we are using to detect when the aeration fans are on or off. The Hobo sensor detects changes in the AC magnetic field when a motor is turned on and stores the date and time it occurred. These devices are attached to the aeration motors. They can be left out in the field for about a month before we download the data from them. The information that the Hobos give us can be very useful when it is combined with data from the temperature cables in the grain and with weather data. We hope that these sensors will let us develop an aeration program that cools grain as soon as possible, with the least number of fan hours. This should help to prevent insect and mold problems from developing in the grain.

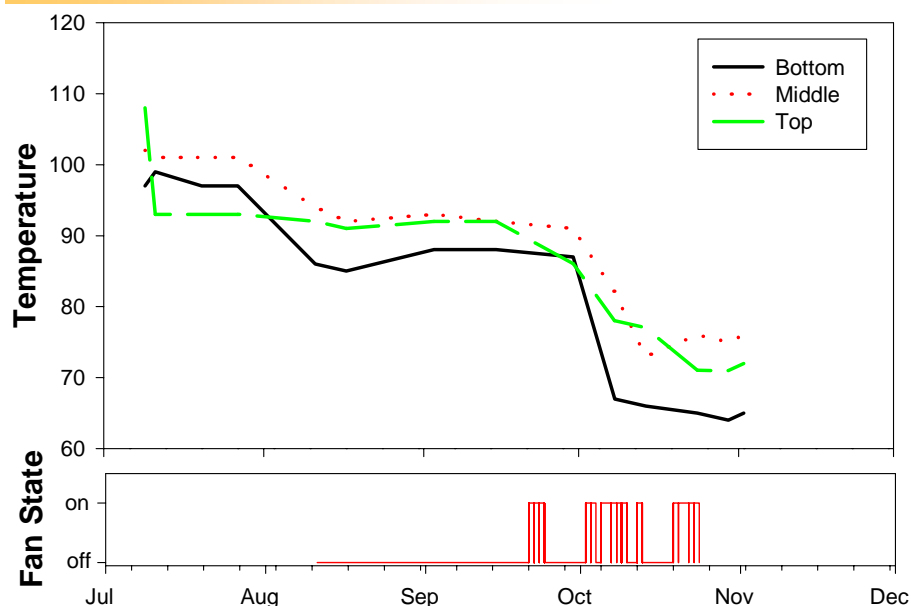


True or False?

- 1) Insects can't develop if the grain temperature is below 55 F.
- 2) The number of phosphine tablets to use is based on the amount of grain, not the bin volume.
- 3) Indianmeal moth is one of the most damaging pests of stored wheat.

Answers on the

Kansas Edition

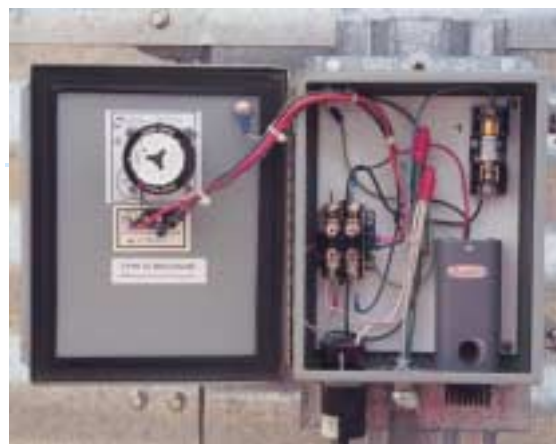


What we learned

The figure on the left shows thermocouple data for one concrete silo with temperatures in the top, middle and bottom of the grain mass. The lower graph shows when the aeration fan was on or off. We used a Hobo sensor to collect this data. The Hobo data indicates that the fan was not turned on until the 4th week in Sept., and that the most effective cooling was during the first two weeks of October. Subsequent aeration had little effect on grain temperature. Automatic aeration control could have cooled this bin sooner and with fewer fan hours.

Plans for the future

Automatic aeration controllers are an efficient way to cool grain. They minimize shrink and energy costs, allowing grain to be cooled earlier in the storage season. Controllers don't have to be complex. They can be made from a simple thermostat that turns on aeration fans whenever temperatures are below a certain set point. For example, the three setpoints could be, 75°F, 65°F and 45°F. The controller is switched to the next setpoint after the hour meter has accumulated enough fan hours to indicate a cooling front has completely passed through the grain mass. Depending on the fan and bin size, this could range from 80 to 150 hours.



Personnel

The Areawide IPM team for KSU is, from left to right, top row: Clinton Bullard (graduate Fort Hays State College), Tyrone Baker (graduate U. of Central Oklahoma), Loren Henson (worked for Kansas State Grain Inspection), bottom row: Mary McCoy (working on degree at KSU), Lyle Fritzmeir (attended KSU, farmer for 9 yr), Stana Collins (graduate KSU) Skip Allen (Tech. Manager for this project). The Areawide IPM Team's mission is to collect data from 13 different elevators on insect numbers, grain quality factors, grain temperatures, Hobo data, bin boards, management practices, and enter it into a database. This is no small task!



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Management team: David Hagstrum, Paul Flinn, Tom Phillips & Carl Reed

Scientists: Frank Arthur, Gerrit Cuperus, Alan Dowdy, Phil Kenkel, George Lippert, Mike Mullen, Ron Noyes, and Jim Throne

Coordinator: Sherry Craycraft

Tech. Manager: Skip Allen 316 728 0147

Technicians: Tyrone Baker, Clinton Bullard, Stana Collins, Lyle Fritzmeier, Loren Henson, Mary McCoy, Andrew Svoboda, and Ryan Rewerts